इंटरनेट मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 11332 (1985): Code of practice for industrial ovens [MED 17: Chemical Engineering Plants and Related Equipment]

“ज्ञान से एक नये भारत का निर्माण”
Satyanarayan Gangaram Pitroda
“Invent a New India Using Knowledge”

Act Number 22 of 2005
The Indian Parliament
RIGHT TO INFORMATION

Made Available By
Public.Resource.Org

“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”
Bhartṛhari—Nītiśatakam
“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE

BRUTUM FULMEN

IGNORANTIA JURIS NON EXCUSAT

PROTECTED BY COPYRIGHT

UDC 662·92 : 006·76

IS : 11332 - 1985

(Reaffirmed 2003)

Indian Standard

CODE OF PRACTICE FOR INDUSTRIAL OVENS

Chemical Engineering Sectional Committee, EDC 57; Heat Generation and Heat Transfer Equipment Subcommittee, EDC 57 : 3 [Ref : Doc : EDC 57 (4131)]

1. Scope — Covers the nomenclature, location, construction and safety equipment for industrial ovens or furnaces.

1.1 For the purpose of this standard, an oven shall be any heated enclosure operating at approximately atmospheric pressure, used by industry for the processing of material.

2. Definitions — For the purpose of this standard, the following definitions shall apply.

2.1 *After-Burner System* — After-burner system means a separate or independent combustion system usually removed from the processing area of an oven, to entrain the process exhaust vapours or fumes as they are generated, for the purpose of thermal decomposition and/or heat recovery.

2.2 *Air Flow Switch* — A device actuated by the flow of air in a duct system.

2.3 *Air Gas Mixer* — A device into which the fuel gas and the primary combustion air are introduced, mixed and then delivered to the burner nozzle.

2.4 *Atmospheric Inspirator* — A device which utilizes the kinetic energy of the fuel gas under pressure, to inject all or part of the combustion air required as primary air from the ambient.

2.5 *Burner (or Nozzle)* — A device through which combustion air and fuel are released into the combustion zone.

2.6 *Blast Tip* — A small burner nozzle so made that flames will not blow away from it, even with high mixture pressure.

2.7 *Burner Turndown* — The ratio of maximum to minimum burner fuel input rates.

2.8 *Diaphragm Burner* — A burner which utilize a porous refractory diaphragm as the part so that the combustion takes place over the entire area of this refractory diaphragm.

2.9 *Enclosed Combustion Burner* — A burner which confines the combustion in a small chamber of miniature furnace and only the high temperature completely combusted gases, in the form of high velocity jets or streams are used for heating.

2.10 *Multiport Burner* - A burner having two or more separate discharge openings or ports. (These ports may be either flush or raised.)

2.11 *Catalyst Combustion System* — An oven heater of any construction that employ catalysts to accelerate the oxidation or combustion of fuel-air or fume-air mixtures for eventual release of heat to an oven process.

2.12 *Combustion Safeguard* — A safety control responsive directly to flame properties; it senses the presence and/or absence of flame and deenergizes the fuel safety valve in the event of flame failure within 4 seconds of the loss of flame signal.

2.13 *Continuous Vapour Concentration Indicators and Controllers* — Devices which measure and indicate, directly or indirectly in percentage of the lower explosion limit, the concentration of a flammable vapour air mixture.

2.14 *Direct Fired* — Any heating system where the products of combustion enter the oven chamber and come in contact with the work in progress.

2.15 *Explosive Range (Limits of Flammability)* — The range of concentration of a flammable gas in air within which flame is propagated.

2.16 *Ignition Temperature* — The lowest temperature at which a gas-air mixture may ignite and continue to burn.

2.17 *Indirect Fired External Heater* — An oven heater in which burner and combustion chamber are outside the oven chamber and the oven atmosphere is kept separate from combustion gases.

Adopted 25 June 1985	© January 1986, ISI	Gr 2

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

2.18 *Limit Switch (For Use on Oven Doors or Ventilation System Dampers)* — A device consisting of a lever and suitable connecting mechanism to a switch contact.

2.19 *Mechanical Mixer* — A mixer using mechanical means to mix gas and air, neglecting entirely any kinetic energy in the gas and air, and compressing the resultant mixture to a pressure suitable for delivery to its point of use.

2.20 *Mixing Blower* — A motor-driven blower to produce air gas mixture for combustion through one or more gas burners or nozzles on a single zone industrial heating appliances or on each control zone of a multizone installation.

2.21 *Oven* — A heated enclosure operating at approximately atmospheric pressure used by industry for the purpose of processing of material.

2.22 *Batch Process Ovens* — Ovens into which the work charge is introduced all at one time so that the evaporation of flammable volatiles within the oven is not at a constant rate.

2.23 *Continuous Process Ovens* — Ovens into which the work charge is more or less continuously introduced, as by a conveyor, so that evaporation of flammable volatiles within the oven approaches a constant rate.

2.24 *Pilot* — A flame that is used to light the main burner.

2.25 *Proportioning Inspirator* — An inspirating tube which, when supplied with gas, will draw into the gas stream all the air necessary for combustion.

2.26 *Suction System* — A system applying suction to a combustion chamber to draw in the air and/or gas necessary to produce the desired combustible mixture.

2.27 *Zero Governor/Atmospheric Regulator* — A diaphragm type regulator that maintains the fuel-gas pressure at atmospheric or zero gauge pressure.

3. Marking — Each oven shall have a nameplate affixed at a suitable place giving the following data:

Solvent used........................

Solvents and volatiles entering oven..................m^3/Batch or per hour

Purging interval...................................min

Oven temperature..................................°C

Exhaust blower rated for.............................m^3/hour or per batch

At maximum operating temperature of........................°C

Manufacturer's serial number..........................

Manufacturer's name and address.....................

4. *Location* — The oven shall be located with consideration to the possibility of fire resulting from overheating or from the escape of fuel and the possibility of building damage and personnel injury resulting from an explosion.

4.1 Special consideration shall be given to the location for ovens processing flammable material or when using fuel with a specific gravity greater than air.

4.2 Industrial ovens and furnaces shall be safely located and protected from exposure to dip tanks, spray booths, storage and mixing rooms for flammable liquids or storage areas used for readily flammable material, or exposure from or to the diffusion of flammable vapour air mixture.

4.3 The room in which flammable vapours and powder are produced shall be ventilated in such a manner that the atmosphere in the vicinity of the operations will be kept well below the lower explosive limit. Flow of ventilating air from the room or area shall be away from the oven.

5. Construction — Ovens shall be constructed of non-combustible material. Where refractory material are used, they shall be adequately supported.

5.1 Ovens which may contain flammable liquids, vapours or gases shall be equipped with unobstructed relief vents for freely relieving internal explosion pressure.

5.2 Explosion venting panels or doors shall be arranged so that, when open, the full vent opening will be an effective relief area. In installation, care shall be taken to make sure that the operation of relief vents to their full capacity is not obstructed by low ceilings, piping, building columns, or walls, instrument panels or other fixed equipment.

5.3 Adequate facilities for access shall be provided to permit proper inspection and maintenance.

5.4 Where ladders or steps are needed to reach valves or other controls, they shall be non-combustible and provided as an integral part of the equipment.

5.5 When petroleum oil or other combustible fluids must be used for door operation, lifts for work loads, and conveyor systems the hydraulic system shall be designed to minimize the possibility of fluid release which may result in a fire or explosion.

6. Heating System — The source of heat may be either internal or external. The unit may be direct fuel fired (when the products of combustion contact the work) or indirect fuel fired. The transfer of heat into and throughout the unit may be by convection, conduction and radiation, or by combination of these.

6.1 Burners, along with associated mixing, valving and safety controls and other auxiliary components, shall be properly selected for the intended application, suitable for the type and pressure of the fuel gases to be used, and for the temperatures to which they will be subjected.

6.2 Valves shall be provided to permit turning off the fuel in an emergency and shall be located so that fires, explosions, etc, at ovens/furnaces will not prevent access to these valves.

6.3 All burner shall maintain a stable flame with neither flashback nor blow off, over the entire range of turn down that will be encountered during operation when supplied with combustion air and the designed fuel gases in the proper proportions and in the proper pressure ranges.

7. Heater Location — Heaters shall not be located directly under the product being heated where combustible material may drop and accumulate. Neither shall they be located directly over readily ignited materials, such as cotton, unless for controlled exposure time, as in continous process, where further automatic provisions and/or arrangement of guard baffles preclude the possibility of ignition.

7.1 External parts of oven heaters which operate at temperatures in excess of 71°C shall be guarded. Where impractical to guard, warning signs shall be mounted or permanent floor markings shall be provided to be visible to personnel entering the area.

8. Safety — Careful consideration shall be given to the safe removal, dilution or other disposal of flammable vapours or vapour — air mixtures. To do this, all necessary consideration shall be given to temperatures of operation, period of dripping and predrying, speed of conveyor travel, safe disposal of flammable drippings, safe control of combustion and the safety of chains, carrier belts, hooks, racks and carts.

8.1 Ovens in which flammable or toxic vapours are liberated shall be mechanically ventilated to outdoor atmosphere regardless of the type of heating equipment employed.

8.2 Exhaust duct openings shall be located in the area of greatest concentration of vapours.

8.3 Ovens in which the temperature is controlled by dampers (manual or automatic) which affect the volume of hot air admitted to the oven shall be designed so that a reduction in the volume of hot air supplied does not result in a reduction of the volume of fresh air supplied to meet the requirements for safety ventilation.

9. Rate of Ventilation — In continous process ovens, the safety ventilation rate shall be designed and maintained to prevent the vapour concentration in the oven from exceeding 25 percent of the lower explosive limit.

9.1 Flammable vapour concentration indicators shall be used to test flammable vapours having a flash point below 21°C unless it is possible to maintain the sampling line and measuring assembly at the temperature of vapours, so that concentration will not occur.

10. Inspection and Maintenance

10.1 Foreign material, parts and residue shall be removed from recirculation blowers, burner and pilot ports, combustion blowers duct work and oven interior. Duct work shall be checked for obstructions.

10.2 Recirculation and exhaust system blowers that are V-belt driven shall be checked for proper belt tension and excessive belt wear.

10.3 It shall be the user's responsibility to periodically check the type and amount of solvent entering the oven, to ensure that the solvent loading does not exceed the capacity of the exhaust system.

11. Fire Protection

11.1 Ovens containing or processing sufficient combustible material to sustain a fire, shall be equipped with automatic sprinklers. This shall include sprinklers in the exhaust ducts when necessary.

11.2 *Automatic Sprinkler Systems* — When oven temperatures are over 241°C or where flash fire conditions may exist, an open sprinkler system supplied by an approved deluge valve equipped with a hand pull for manual operation, and controlled by heat actuated devices, is recommended within the oven.

11.2.1 When rapid temperature changes may be anticipated that will result in premature operation of rate of rise release equipment, fixed temperature controls shall be used.

11.3 *Water Spray Systems* — Protection system utilizing the applications of water in finely divided form may be provided to protect oven enclosures.

11.3.1 Where fire in an oven may involve other equipment as may be the case in 'in line' coating or finishing operations, water spray systems actuated by high speed detection devices, shall be provided to protect the oven work openings. Manual controls for these systems shall also be provided.

11.4 *Supplementary Fire Protection* — If desired, permanently installed supplementary protection of an approved type such as carbon dioxide, foam and dry chemical may be provided. Such protection is not a substitute for automatic sprinklers.

EXPLANATORY NOTE

Explosion and fires in fuel fired steam and electric heat utilization equipment constitutes a loss potential in life, property and production. This standard is a compilation of guidelines, rules and methods applicable to safe operation of this type of equipment.

In the preparation of this standard, considerable assistance has been derived from ANSI/NFPA 86A-1978 issued by the American National Standard Institute.

Printed at Delhi Printers, Delhi, India